from 18 to 20 miles; but in Pembrokeshire its breadth is only from 3 to 5 miles.

On the northern half of the basin the strata rise gradually northward; on the south side they rise southward, except at the east end, where they rise eastward. The deepest part of the basin is between Neath, in Glamorganshire, and Llanelly in Carmarthenshire, where the depth of the principal strata of coal and iron ore is from 600 to 700 fathoms; whereas in Pembrokeshire, none of the strata lie above 80 or 100 fathoms deep.

The strata of coal at the east end of the basin and on the north side, are chiefly of a cokeing quality; but they alter, towards St. Bride's Bay, to what is called stone coal: on the south side of the basin the strata are principally of a bituminous or binding quality.

In this mineral basin there are 12 veins, or strata of coal, from 3 to 9 feet thick; and 11 others, from 18 inches to 3 feet, making in all 95 feet, besides a number of smaller veins, from 6 to 18 inches in thickness.

There are in these strata many faults or irregularities, by which the due range of the strata is thrown out of course. These faults are not confined to the edges of the strata, but run through the interior of the basin generally, in a north and south direction, and often throw the whole of the strata, for hundreds of acres together, 40, 60, 80, or 100 fathoms up or down. There is, however, seldom any superficial appearance that indicates a disjunction; for the greatest faults frequently lie under even surfaces.

A very considerable fault is observable at Crib-bath, where the beds, or strata of the limestone, stand erect. Another fault of great magnitude lies between Ystradvellte and Penderryn, where all the strata, and the north side of the basin, are moved many hundred yards southward.

The limestone appears at the surface, all along the boundary line, in the counties of Monmouth, Glamorgan, Carmarthen, and Brecon; and no doubt can be entertained that it ranges from Newton, across Swansea Bay, to the Mumbles, and from Canmaddock Hill, across Carmarthen Bay, to Langam Tenby. In Pembrokeshire it appears at the surface only in some particular spots; yet it certainly forms an under-ground connexion from one spot to the other.

Glamorganshire possesses by far the greatest portion of coal and iron ore; Monmouthshire is the next in point of quantity; then Carmarthenshire; then Pembrokeshire; and lastly Brecknockshire, which possesses the least.

Observations on the Permanency of the Variation of the Compass at Jamaica. In a Letter from Mr. James Robertson *to the Right Hon. Sir* Joseph Banks, *K.B. P.R.S. &c.* Read June 12, 1806. [*Phil. Trans.* 1806, *p.* 348.]

The object of Mr. Robertson, who resided in Jamaica, as a King's Surveyor of Land, upwards of twenty years, is to show that no

alteration has, for a considerable period, taken place there in the variation of the compass. In that island all grants of land have a diagram thereof annexed to the patent, which diagram is delineated from an actual survey of the land to be granted, and has a meridional line, according to the magnetical needle, laid down upon it; but no notice is taken of the true meridian. The boundary lines are marked upon the land; and in all disputes where the keeping up of these lines has been neglected, surveyors are appointed to make actual re-surveys, which are compared with those preserved in the secretary of the island's office; and it is expected that the lines and meridians of the former will coincide with those of the latter. It is evident, however, that this coincidence could not happen if any alteration in the variation had taken place in the interval between the two surveys. Mr. Robertson's business, as a surveyor, having been very extensive, he has had many opportunities of investigating the fact here treated of; and it appears from his observations, that the courses of the lines and meridians delineated on diagrams annexed to patents granted so long ago as the year 1660, coincide with, and are parallel to, the lines and meridians delineated on the re-surveys annexed to deeds, &c., or on the new diagrams, from recent surveys made by means of the magnetical needle, consequently no variation of the needle could have taken place, in Jamaica, during the above period of time.

Our author subjoins to his paper a short history of the practice of surveying in Jamaica, from the Restoration to the present time, in order to obviate any doubt whether the quantity of the magnetical variation was not ascertained and allowed for in the first diagrams annexed to patents; and whether the present variation of $6\frac{1}{2}$ degrees east, might not then have agreed with the true meridian. He remarks, that until the year 1700, when Dr. Halley published his theory of the variation of the compass, no observations to ascertain the quantity of the variation in the West Indies had (so far as he knows) been published; and the variation at Jamaica, as laid down by Dr. Halley, appears to have been the same as it is at present. Besides, had the first surveyors allowed for the variation, in delineating their diagrams, they would not have omitted to mention it; and the same system of surveying would have been continued, since a difference of $6\frac{1}{2}^\circ$ would have so totally deranged all boundaries, as to have demanded legislative interference and correction. But no instance of this kind has occurred.

In the maps of the island made by the direction of Sir Henry Moore, Governor (about the year 1760), the magnetic meridian only is represented, although that gentleman was considered a great surveyor. In short, the true meridian, our author says, has never been noticed, nor the quantity of variation ascertained, nor the latitude or longitude observed, by any surveyor or engineer in Jamaica except himself. He has ascertained the variation to be $6\frac{1}{2}^\circ$ east, and has assumed that as the true quantity, in the maps lately published by him.